

Momentum & Impulse

Momentum, p

Think of momentum, *p*, as a measure of how hard it is to change an object's velocity or bring it to rest.

• p = mv

Impulse, J

Impulse is change in momentum

- $\int = m(v_f v_i)$
-] = Ft
- $Ft = m(v_f v_i)$

Note that $m(v_f - v_i)$ is the same as $m \Delta v$



Collisions and Projectiles

In a collision or the firing of a projectile, the total momentum before the collision or firing is the same as the total momentum afterward.

Elastic Collisions (Objects bounce)

 $m_1 v_{1i} + m_2 v_{2i} = m_1 v_{1f} + m_2 v_{2f}$

Inelastic Collisions (Objects stick)

 $m_1 v_{1i} + m_2 v_{2i} = (m_1 + m_2) v_f$

Projectiles (Guns, etc.)

 $0 = m_1 v_{1f} + m_2 v_{2f}$